Position Statement

SOUTH DAKOTA

ISL Dewey-Burdock EPA Class 3 and Class 5 UIC injection wells for mining and other hazardous waste deposition - March 2017

Help Us Stop This!

(https://knowmining.org/#portfolio)

Summary:

The Hong Kong/China based uranium mining company, Powertech/Azarga that has been pursuing ISL (in situ leach recovery) mining permits in the Dewey-Burdock, Edgemont area of the Black Hills, is currently requesting permits from the EPA for waivers from the Clean Water Act for the Inyan Kara aquifer in order to implement UIC injection wells for mining, and for hazardous waste permanent deposition from mining activity in the Minnelusa aquifer.

We are opposed to both the mining activity, which would contaminate the Inyan Kara aquifer permanently for agricultural use, for which it is currently being used, and also contaminate other aquifers in the area as well, because of the many fissures, fractures, breccia pipes and sinkholes that are naturally occurring, and the 7,650 unclosed old exploratory boreholes that allow the mixing of aquifers at the site.

We are opposed to the permanent deposition of any mining wastes, including hazardous and radioactive metals and/or metal salts thereof into any aquifers in the Black Hills which would effectively render the Black Hills a permanent hazardous waste dump-site - and with the ability of the permit holder to take in mining waste from other regional sites, and also sell that permit to other polluters.

We are opposed to injection of chemical lixivients that would dissolve rock and free up toxic metals to pollute the groundwater aquifers in the mining process, that cannot be effectively cleaned up.

Background of Powertech/Azarga:

The Issue of the 12 Requested Hazardous Deep Injection Wells by Powertech/Azarga at Edgemont, vs the 4 That Would be Permitted

COMPANY HISTORY

1.) Powertech/Azarga is a Chinese based - foreign owned company that is essentially bankrupt. The partners took over a bankrupt refrigerator manufacturing company shell and then declared themselves a uranium mining company, though to date, this company has never mined anything anywhere. As a foreign owned company, they are free to mine and then bankrupt the company when mining reserves are gone, leaving the hazardous and radioactive mess for the taxpayers to clean up. This is the most common scenario with foreign owned mining companies in the U.S. Further, no aquifer has ever been restored anywhere in the world after ISL uranium mining. For this reason, ISL mining is banned in Europe, where numerous mines have completely ruined many aquifers.

2.) Evidence was presented to the NRC and ASLB in hearings appealing the mining permit issued by the NRC. It was disclosed in these hearings that the Tennessee Valley Assoc. thoroughly explored the area in question for more mine-able uranium deposits after the roll front of uranium was mined out in the 1950's by surface mining. TVA came to the area several times, years apart, and drilled a total of 7650 boreholes looking for more mine-able/extractable uranium, but failed to find any. TVA subsequently abandoned the site, leaving those boreholes not properly closed for the most part, that then allowed further mixing of the aquifers even more than the already naturally existing numerous fractures, fissures, breccia pipes and sinkholes that are common in this continuing uplift region. This was when uranium yellow-cake was in high demand during the Cold War and the spot price was $100.00 per lb. Today, the spot price for yellow-cake is currently $18.00 per lb, with the production break even cost of $63.00 per lb. Powertech/Azarga was ordered by NRC/ASLB to find and properly close all of those boreholes before they would be able to actively mine, as ISL mining requires aquifers to be contained properly for extraction efficiency. This is a hugely expensive process and to date, no work has been done on this. Powertech/Azarga does not have the finances to do this, and ISL uranium mining is not profitable today, and not projected to be in the future.

3.) In addition, ISL technology was available back in the 1950's and 60's when the exploration was done, but the amount of "recoverable" uranium at Dewey Burdock was not deemed sufficient by TVA for mining in any form, as they said that the roll front was gone. So by these **former experts, upon extensive exploration, there is no recoverable uranium at that site left.** Powertech/Azarga's own testing showed that the highest levels of uranium found were in the alluvial wells that are surface, and not mine-able, as they cannot be contained. With the extensive mixing of aquifers and the 7650 open boreholes that contaminate the aquifers, there is likely organified uranium and other toxic metals by bacteria that create a form of organic uranium that is not recoverable by ISL anyway. Organic uranium does not bind to the resin beads in the "glorified water softeners" of ISL recovery. So the only **money to be made at this site is from taking in hazardous toxic mining wastes from other mines to dump into our aquifers and make the Black Hills a toxic waste dump.**

4.) Powertech/Azarga is asking for 4 Class 5 UIC deep injection wells for hazardous waste deposition, into the Minnelusa aquifer, with a reserve request for 4 more of the same "in case they find the they need them". They say they need 2 of these "right away". Powertech/Azarga will operate 14 well fields total. **The Minnelusa aquifer is a major drinking water aquifer in the Black Hills. To say that it is not, is not correct.**

A. For comparison, Crow Butte ISL uranium mine in Crawford, Nebraska, operated 11 well fields for 20 yrs using a single UIC hazardous waste deep injection well for deposition of their toxic wastes. Dewey Burdock originally requested a total of 8 UIC hazardous waste deep injection wells, but EPA is only permitting 4, still too many for a non functional, no profit mine, two of which are requested to be drilled right away. (Really? What do they need them all for? No work has been done to find and properly close any of the old borehole sites that is required by NRC, followed by adequate pump testing to make sure that the aquifer is contained prior to actively mining. EPA is not requiring borehole closure for the injection wells. This spells certain "disaster" even more.)

- By the numbers: Smith Ranch in WY :10 well fields, one deep injection well Crow Butte, Ne : 11 well fields, one deep injection well for 20 yrs. Willow Creek, composed of two sites, Christensen Ranch and Irigary- 2 injection wells.

5.) Powertech/Azarga has also applied for Class 3 injection wells for 14 well fields. This will be an additional 84 injection wells that will be receiving rock dissolving chemicals/lixivients for production. Normally a well field contains one production well for extraction surrounded by 6 injection wells. Further, the 14 production well fields are not on a uranium rich roll front, as per TVA documents. (uranium ISL mines are typically situated on a uranium rich roll front so that extraction is efficient and the mine is profitable. Remember, the roll front was found by TVA to be mined out prior by surface mining)

6.) The 4 hazardous waste deep injection wells in the area are destined for the Minnelusa aquifer, a drinking water aquifer in the Black Hills. **Normally, UIC hazardous waste deep injection wells are drilled "below" aquifers, not "in" them. The hazardous waste injected into the aquifer will travel hundreds and even thousands of miles and contaminate other**

aquifers that are connected, and ultimately the huge Ogallala Aquifer that services the entire central US. In addition, these hazardous waste wells will legally be able to take in the water of the hazardous wastes, containing radioactives, with toxic and heavy metals from other mining sites, to make our aquifers a toxic waste dump, and ruin the water we have there. These permits are also able to be sold to another company once issued, if the original company Azarga/Powertech files bankruptcy or sells the permits. These permits, once issued, can be renewed indefinitely. Since the wastewater will contain radioactives and toxic heavy metals, the ultimate destination as to which class of deposition well is required, is determined by the proximity of the drinking water aquifer near it, above or below. Powertech /Azarga has played a semantics game with the determination of the class of disposal well required, however the toxicity of the ultimate wastewater is still the same. See "From the Permit" below.

7.) The claim that Powertech/Azarga is going to treat the wastewater first to "purify" it to classify for the Class 5 deep injection regulations, does not include the inability to extract radioactive organified metals that are now found in wastewater by ISL in several studies, notably uranium. By regulation, Class 5 waste waters can only be as toxic as storm sewer waters. This wastewater is hardly that. Radioactive organified metals and metallic salts in this wastewater make this waste water unusable for even agricultural purposes, as it would be in this dry uplift area where water is "blue gold", if it were as "pure" as the company says it is. Better technology today shows us the flaws of obsolete testing and regulations today, and why we see such horrid toxicities in Nature at mining sites. The company has not shown any technology that could be effective in processing this wastewater to be safe for a Class 5 well. And the extra great expense of this processing will cost the profitability of the project dearly. They already cannot pay their mining land leases and are essentially bankrupt going in to this project. See the toxicology testimony by Linsey McLean, expert witness for Consolidated Intervenors, to the Nuclear Regulatory Commission and Atomic Safety and Licensing Board on the birth deformities found in wildlife and domestic farm animals studied in ISL mining sites contaminated by toxic waste water and radioactive metals.

https://www.nrc.gov/docs/ML1513/ML15132A507.pdf
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https://www.nrc.gov/docs/ML1513/ML15132A506.pdf
(https://www.nrc.gov/docs/ML1513/ML15132A506.pdf)

The business model for this Chinese based company in Dewey-Burdock is very likely to never start uranium mining to begin with, as by their own admission, the price of uranium is far too low for profitability. They intend to use these injection wells for importing hazardous toxic mining wastes from other sites for profit, making the Black Hills an everlasting toxic waste dump. They state that they need two deep injection wells for hazardous wastes *right away*.

What is an Injection well/UIC?

An injection well is a device that places fluid deep underground into porous rock formations, such as sandstone or limestone, or into or below the shallow soil layer. The fluid may be water, wastewater, brine (salt water), or water mixed with chemicals.

In waste water disposal, treated waste water is injected into the ground between impermeable layers of rocks to avoid polluting fresh water supplies or adversely affecting quality of receiving waters.

**In the case of this EPA permit, the injection will go directly into the Minnelusa aquifer and not in rock formations where injections typically are directed.

Injection wells are usually constructed of solid walled pipe to a deep elevation in order to prevent toxic injections from mixing with the surrounding environment.

http://en.wikipedia.org/wiki/Injection_well (http://en.wikipedia.org/wiki/Injection_well)

Until the 1960s, drillers could just dump this stuff wherever they wanted. Being extremely salty and full of chemicals, this is obviously a bad idea. The 1960s saw the introduction of deep injection wells. The idea was that if you could inject fluids into rocks thousands of feet underground, the toxic waste would stay there forever. In order for this to work, the rock layers have to be porous, like a sponge, and the waste has to be injected under pressure to force its way into the rocks.

Regulatory Requirements of Deep Injection Wells

In the United States, injection well activity is regulated by the United States Environmental Protection Agency (EPA) and state governments under the Safe Drinking Water Act (http://en.wikipedia.org/wiki/Safe_Drinking_Water_Act) (SDWA). EPA has issued Underground Injection Control (UIC) regulations in order to protect drinking water sources. The EPA has defined six classes of injection wells.

Class I wells are used for the injection of municipal and industrial wastes beneath underground sources of drinking water.

Class II wells are used for the injection of fluids associated with oil and gas production, including waste from hydraulic fracturing.

Class III wells are used for the injection of fluids used in mineral solution mining (en.wikipedia.org/wiki/Solution_mining) beneath underground sources of drinking water. (ISL Uranium mining falls in here)

Class IV wells, like Class I wells, are used for the injection of hazardous wastes but inject waste into or above underground sources of drinking water instead of below.

Class V wells are those used for all non-hazardous injections that are not covered by Classes I through IV. Examples include storm-water drainage wells and septic system leach fields (en.wikipedia.org/wiki/Septic_drain_field).

Class VI wells are used for the injection of carbon dioxide for sequestration, or long term storage. Currently, there are no Class VI wells in operation, but 6 to 10 wells are expected to be in use by 2016.

http://people.uwec.edu/piercech/HazwasteWebsSp04/
DeepWellInjection/DeepWellInjection.htm
(http://people.uwec.edu/piercech/HazwasteWebsSp04/DeepWellInjection/DeepWellInjection.htm)

Injection Wells Don't Just Pollute

1.) They are **well known to cause earthquakes**, as hazardous wastes are continuously being pumped into the aquifers at high pressure, and the **wastes are meant to stay in the ground forever**. The pressure that the wastes exert in the aquifer forces the wastes to move vertically and horizontally in all directions, mixing with the local waters there and traveling with the flow underground. The pressure also **causes more fractures and fissures** in the rock layers, causing earthquakes, and further **mixing of the wastes into the aquifers**. Fracking is a similar principle. Oklahoma has been the site of numerous fracking areas and have increased a record number of earthquakes and contaminated drinking water wells, and the earthquakes continue even after two years of a fracking ban.

INJECTION-INDUCED EARTHQUAKES

A July 2013 study by US Geological Survey scientist William Ellsworth links earthquakes to wastewater injection sites. In the four years from 2010-2013 the number of earthquakes of magnitude 3.0 or greater in the central and eastern United States increased dramatically. After decades of a steady earthquake rate (average of 21 events/year), activity increased starting in 2001 and peaked at 188 earthquakes in 2011. USGS scientists have found that at some locations the increase in seismicity coincides with the injection of wastewater in deep disposal wells. Injection-induced earthquakes are thought to be caused by pressure changes due to excess fluid injected deep below the surface and are being dubbed "man-made" earthquakes.

http://people.uwec.edu/piercech/HazwasteWebsSp04/
DeepWellInjection/DeepWellInjection.htm
(http://people.uwec.edu/piercech/HazwasteWebsSp04/DeepWellInjection/DeepWellInjection.htm)

References:

High-rate injection is associated with the increase in U.S. mid-continent seismicity (https://pubs.er.usgs.gov/publication/70161978)

Barbara A. Bekins, and Justin L. Rubinstein Abstract An unprecedented increase in earthquakes in the U.S. mid-continent began ... in 2009. Many of these earthquakes have been documented as induced by wastewater injection. We examine the relationship between wastewater injection ... and U.S. mid-continent seismicity using a newly assembled injection well database for the central and eastern United States. We find that the entire ... increase in earthquake rate is associated with fluid injection wells. High-rate injection wells (>300,000 barrels per month) are much more likely to be ...

Induced Earthquakes (https://earthquake.usgs.gov/research/induced/myths.php)

The primary cause of the recent increase in earthquakes in the central United States. Wastewater disposal wells typically operate for longer durations and ... injection wells induce earthquakes. Most injection wells are not associated with felt earthquakes. A combination of many factors is necessary for injection to ... induce felt earthquakes. These include: the injection rate and total volume injected; the presence of faults that are large enough to produce felt ... earthquakes; stresses that are large enough to produce earthquakes; and the presence of pathways for the fluid pressure to travel from the injection ...

Injection-induced earthquakes (https://pubs.er.usgs.gov/publication/70048668)

Abstract Earthquakes in unusual locations have become an important topic of discussion in both North America and Europe, owing to the concern that ... and underground mining, withdrawal of fluids and gas from the subsurface, and injection of fluids into underground formations. Injection-induced ... production of oil and gas from previously unproductive formations. Earthquakes can be induced as part of the process to stimulate the production from tight ... associated with industrial activity, with a focus on the disposal of wastewater by injection in deep wells; assess the scientific understanding of induced ...

A Century of Induced Earthquakes in Oklahoma? (https://www.usgs.gov/news/century-induced-earthquakes-oklahoma)

related to oil production, particularly disposal of wastewater in deep injection wells, are known to potentially cause earthquakes. Prior to the ... Release Date: October 26, 2015The rate of earthquakes has increased sharply since 2009 in the central and eastern United States, with growing ... evidence confirming that these earthquakes are primarily caused by human activity, namely the injection of wastewater in deep disposal wells. The rate of ... earthquakes has increased sharply since 2009 in the central and eastern United States, with growing evidence confirming that these earthquakes are ...

Sharp increase in central Oklahoma seismicity 2009-2014 induced by massive wastewater injection (https://pubs.er.usgs.gov/publication/70137863)

data required to unequivocally link earthquakes to injection are rarely accessible. Here we use seismicity and hydro-geological models to show that ... earthquakes to distances of 35 km, with a triggering threshold of ~0.07 MPa. Although thousands of disposal wells may operate aseismically, four of ... Sharp increase in central Oklahoma seismicity 2009-2014 induced by massive wastewater injection Science By: Kathleen, M. Keranen, Geoffrey A. Abers ... , Matthew Weingarten, Barbara A. Bekins, and Shemin Ge

2.) **Other common problems with deep injection wells are non approved hazardous wastes being dumped in there, as there is essentially no daily oversight.** Wells are not maintained well and over pressure causes pipes to crack, dispersing the toxins in higher levels than they are supposed to be. Spills are common on the surface and accidents when truck hauling the toxins slip off road in icy roads, hit deer etc. and cause an instant dirty bomb at the site, that is not able to be cleaned up as it soaks into the ground. In this case, toxic and heavy metals and radiation.

2008-2010
Cases of Water Contamination Violations

CLASS-2 WELLS: 22

OTHER WELLS: 77

Cases of Unauthorized Injection = **859**

Cases of Pressurized Injection = **1,199**

Test Failures for Significant Leaks = **6,723**

Total Wells with Violations = **60,467**

http://projects.propublica.org/graphics/underground-injection-wells (http://projects.propublica.org/graphics/underground-injection-wells)

STRUCTURAL FAILURES

A ProPublica review of well records, case histories, and government summaries of more than 220,000 well inspections from October 2007 to October 2010 found that structural failures inside injection wells are routine. From late 2007 to late 2010, one well integrity violation was issued for every six deep injection wells examined — more than 17,000 violations nationally. More than 7,000 wells showed signs that their walls were leaking. Records also showed wells are frequently operated in violation of safety regulations and under conditions that greatly increase the risk of fluid leakage and the threat of water contamination. ProPublica's analysis showed that, when an injection well fails, it is most often because of holes or cracks in the well structure itself.

UNAUTHORIZED INJECTION

Basically illegal dumping, EPA officials describe this as the most serious of all violations. It means waste was dumped into a well without a permit or without being legally approved for a certain location. State regulators say most violations are for bad paperwork, but in some cases, oil and gas companies have dumped dangerous waste meant for Class 1 wells into Class 2 wells to avoid fees and tighter regulations.

MECHANICAL INTEGRITY VIOLATION

Mechanical Integrity testing, or MIT, is the primary way of checking the condition of injection wells. All Class 1 and Class 2 deep injection wells are required to be tested regularly, often by pressurizing the well and waiting to see if any of the pressure escapes, indicating a crack in one of the well's layers. Regulators say most violations indicate a small problem that, caught early, prevents a larger failure in the future. But some failures noted in federal records do describe "significant"leaks and migration of waste.

OVER PRESSURIZED INJECTION

When waste is injected at higher pressure than is allowed on an injection well permit, it can either break out of the well or fracture the rock underground, creating new pathways for that waste to migrate into, and pollute, water supplies. A violation means that the pressure caused waste to move outside of its intended zone and endanger drinking water.

TEST FAILURES FOR SIGNIFICANT LEAKS

This means that a well failed a mechanical integrity test and "caused the movement of fluids outside of the authorized zone," because either its cement or steel structure, or the tubing that lines the inside of the well, had a crack.

WATER CONTAMINATION

In the reports each state submits to the EPA annually, they list the number of cases where an underground source of drinking water was believed to have been polluted as a result of leaking injection wells.

http://www.sourcewatch.org/index.php/Injection_well

(http://www.sourcewatch.org/index.php/Injection_well)

Here are some of the multiple regulations for the construction and maintenance of monitoring and testing wells:

- follow waste analysis plan
- perform MITs at required intervals
- reporting and record Keeping
- record injection fluids and all monitoring results
- report on any changes at facility and noncompliances

Closing

- flush well with non-reactive fluid
- submit plugging and abandonment report
- monitor ground water until injection zone pressure can no longer influence any USDW
- inform authorities of well location and zone of influence

Siting

- AoR testing
- no-migration petition demonstration
- geological studies

Construction

- well is cased and cemented
- proper tubing and packer
- UIC program director must approve plan

Operation

- monitor injection pressure, flow rate, and volume
- alarms and devices to shut down flow if necessary
- maintain pressures that will not initiate cracking

http://www.epa.gov/safewater/uic/classonestudy.pdf (http://www.epa.gov/safewater/uic/classonestudy.pdf)

http://www.mindfully.org/Water/2003/Deep-Injection-Wells-GAO13jul03.htm (http://www.mindfully.org/Water/2003/Deep-Injection-Wells-GAO13jul03.htm)

Problems with Recovery of Mined Minerals When Organic Compounds Contaminate an Aquifer

Summary: You cannot recover all of the uranium from the mining water. Organified uranium compound levels will build up in the wastewater.

Arabian Journal of Chemistry

Volume 4, Issue 4, October 2011 (www.sciencedirect.com/science/journal/18785352/4/4), Pages 361–377

PROBLEMS WITH ION EXCHANGE IN WATER PURIFICATION

Ion exchange is another method used successfully in the industry for the removal of heavy metals from effluent. An ion exchanger is a solid capable of exchanging either cations or anions from the surrounding materials. **Commonly used matrices for ion exchange are synthetic organic ion exchange resins. The disadvantage of this method is that it cannot handle concentrated metal solution as the matrix gets easily fouled by organics and other solids in the wastewater.** Moreover ion exchange is non-selective and is highly sensitive to the pH of the solution. (Kurniawan et al., 2006).

ORGANIFIED URANIUM IS A REAL THING IN ISL MINES

http://www.newswise.com/articles/slac-study-helps-explain-why-uranium-persists-in-groundwater-at-former-mining-sites (http://www.newswise.com/articles/slac-study-helps-explain-why-uranium-persists-in-groundwater-at-former-mining-sites)

- SLAC Study Helps Explain Why Uranium Persists in Groundwater at Former Mining Sites
- New Details About Uranium Chemistry Show How It Binds to Organic Matter

Article ID: 668799
Released: 2-Feb-2017 2:05 PM EST
Source Newsroom: **SLAC National Accelerator Laboratory**

Newswise — Decades after a uranium mine is shuttered, the radioactive element can still persist in groundwater at the site, despite cleanup efforts.

A recent study led by scientists at the Department of Energy's SLAC National Accelerator Laboratory helps describe how the contaminant cycles through the environment at former uranium mining sites and why it can be difficult to remove. Contrary to assumptions that have been used for modeling uranium behavior, researchers found the contaminant binds to organic matter in sediments. The findings provide more accurate information for monitoring and remediation at the sites.

The results were published in the Proceedings of the National Academy of Sciences.

In 2014, researchers at SLAC's Stanford Synchrotron Radiation Lightsource (SSRL) began collaborating with the DOE Office of Legacy Management, which handles contaminated sites associated with the legacy of DOE's nuclear energy and weapons production activities. Through projects associated with the Uranium Mill Tailings Radiation Control Act, the DOE remediated 22 sites in Colorado, Wyoming and New Mexico where uranium had been extracted and processed during the 1940s to 1970s.

Uranium was removed from the sites as part of the cleanup process, and the former mines and waste piles were capped more than two decades ago. Remaining uranium deep in the subsurface under the capped waste piles was expected to leave these sites due to natural groundwater flow. However, uranium has persisted at elevated levels in nearby groundwater much longer than predicted by scientific modeling.

In an earlier study, the SLAC team discovered that uranium accumulates in the low-oxygen sediments near one of the waste sites in the upper Colorado River basin. These deposits contain high levels of organic matter—such as plant debris and bacterial communities.

During this latest study, the researchers found the dominant form of uranium in the sediments, known as tetravalent uranium, binds to organic matter and clays in the sediments. This makes it more likely to persist at the sites. The result conflicted with current models used to predict movement and longevity of uranium in sediments, which assumed that it formed an insoluble mineral called uraninite.

Different chemical forms of the element vary widely in how mobile they are—how readily they move around—in water, says Sharon Bone, lead author on the paper and a postdoctoral researcher at SSRL, a DOE Office of Science User Facility.

Since the uranium is bound to organic matter in sediments, it is immobile under certain conditions. Tetravalent uranium may become mobile when the water table drops and oxygen from the air enters spaces in the sediment that were formerly filled with water, particularly if the uranium is bound to organic matter in sediments rather than being stored in insoluble minerals.

"Either you want the uranium to be soluble and completely flushed out by the groundwater, or you just want the uranium to remain in the sediments and stay out of the groundwater," Bone says. "But under fluctuating seasonal conditions, neither happens completely."

This cycling in the aquifer may result in the persistent plumes of uranium contamination found in groundwater, something that wasn't captured by earlier modeling efforts.

"For the most part, uranium contamination has only been looked at in very simple model systems in laboratories," Bone says. "One big advancement is that we are now looking at uranium in its native environmental form in sediments. These dynamics are complicated, and this research will allow us to make field-relevant modeling predictions."

The study combined the expertise of researchers at SLAC, Pacific Northwest National Laboratory and the Canadian Light Source. The research team used a blend of techniques to analyze samples of sediments in the experiment. They performed X-ray spectroscopy at SSRL to identify the chemical form of uranium. Capabilities at the Canadian Light Source and at the Environmental Molecular Science Laboratory (EMSL) at Pacific Northwest National Laboratory were used to map the locations of the elements in the samples at the nanometer scale. This additional information allowed the researchers to determine whether or not the uranium was bound to carbon-containing, or organic, materials. SSRL and EMSL are DOE Office of Science User Facilities.

The DOE Office of Science funded the project.

SLAC is a multi-program laboratory exploring frontier questions in photon science, astrophysics, particle physics and accelerator research. Located in Menlo Park, Calif., SLAC is operated by Stanford University for the U.S. Department of Energy's Office of Science. For more information, please visit slac.stanford.edu (slac.stanford.edu).

SLAC National Accelerator Laboratory is supported by the Office of Science of the U.S. Department of Energy. The Office of Science is the single largest supporter of basic research in the physical sciences in the United States, and is working to address some of the most pressing challenges of our time. For more information, please visit science.energy.gov (science.energy.gov).

The Bottom Line on Leaky Injection Wells, ISR/L Recovery and the Stabilization of Plumes:

If an ISR/L recovery well is contaminated with organic carbon compounds, whether naturally occurring or from leaky underground waste disposals, then the efficiency of recovery of uranium or any other metal by the common ion exchange method will be compromised, and will be rendered unrecoverable.

Moreover, if the organic carbon compounds are stereoisomers, whether naturally occurring or synthetic industry wastes, they will only react with other stereoisomers, so no inorganic method of stabilizing a plume will be effective, as demonstrated at Smith-Highland Ranch in WY.

Contaminated old ISR/L field waters may still test high for the elemental presence of uranium, and be marketed and sold (stocks and investments) as having a high propensity for extraction, but that would not be the case. It would not be recoverable. There is no technology known today that will clean up an aquifer like that.

***Help Us* Stop This!** (https://knowmining.org/#portfolio)

With the impending demise of the EPA, we need restoration of state oversight, repeal of SB158, and new laws in place to prevent heavy hazardous waste tankers from destroying our roads and jeopardizing our clean Black Hills environment with accidents and spills on icy roads, hitting deer etc., and causing a permanent dirty bomb forever at these sites. We need laws now that will prohibit the transportation of these radioactive toxic wastes on our roads, through our state, and bringing in other mines' toxic wastes from other states.

Respectfully submitted to the EPA by Linsey McLean, mclean.linsey@gmail.com

MESSAGE TO THE PUBLIC: PREPARE FOR THE EPA HEARINGS

1.) **Get there early** to sign in for your time to present your concerns.

2.) **You are most effective** if you take the time to write out your understanding of the permit and your objections to it and handing it to the judges. You can save time by reading it aloud to the judges and then submitting the written paper to them for their records. You will have only a short time to speak, so make you comments relevant and pointed. **Be sure to sign your name. If you print your comments out on your computer, be sure to sign your name and address at the bottom to make it legal.**

3.) **Use the science to make your point. Show that you understand the science by explaining why you are against any hazardous waste in our aquifers, whether the Inyan Kara or the Minnelusa, and also why you are against making the Inyan Kara any more compromised than it already is. Both of these aquifers are being used, if not for personal use, then for ag use. Many people with wells in the area, do not even know what aquifer they are in. If you know your well aquifer and it is the Inyan Kara or Minnelusa, you need to make that point..** These judges are scientists and need to hear that you understand and are opposed to this permit. Do Not just get up there and whine about how this doesn't feel good to you. That just gets blown off. Use the studies and scientific points outlined in this document to help you. More if you know more. You only need a couple points to hammer down on.

4.) **Encourage your friends and neighbors** to get involved and come with you to protect our water.

The Permit in Question:

EPA seeks public comment on draft permits and aquifer exemption for uranium mining project in southwestern South Dakota.

Public hearings will be held in Valentine, NE and in Rapid City, Hot Springs and Edgemont, SD.

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(Denver, Colo. – March 6, 2017) EPA has issued two draft Underground Injection Control (UIC) Area Permits to Powertech (USA) Inc., for injection activities related to a proposed uranium recovery project in the southern Black Hills region in Custer and Fall River Counties of South Dakota. EPA will conduct information sessions combined with public hearings on April 27th and on May 8 through May 11 at the times and locations detailed below. EPA will accept public comments on the draft permits and a proposed aquifer exemption associated with the project through May 19, 2017.

The draft permits issued today include a UIC 'Class III' Area Permit for injection wells for the in-situ recovery (ISR) of uranium in the Inyan Kara Group aquifers and a UIC 'Class V' Area Permit for deep injection wells that would be used to dispose of ISR process waste fluids into the Minnelusa Formation below the Inyan Kara after treatment. Under the terms of the draft permits, waste injected under the Class V permit must be treated prior to being injected and must meet all radioactive waste and hazardous waste standards. Monitoring of the underground sources of drinking water surrounding the Class III injection well-fields will take place before, during and after ISR operations to ensure the underground sources of drinking water are protected.

EPA is also proposing an aquifer exemption approval in connection with the draft UIC Class III Area Permit. Specifically, this approval would exempt the uranium-bearing portions of the Inyan Kara Group aquifers from protection under the Safe Drinking Water Act. Such an exemption must be in place before ISR activities within these aquifers can occur.

Under its obligation to comply with the National Historic Preservation Act and under EPA's Tribal Policy on Consultation and Coordination with Indian Tribes, EPA has been consulting and coordinating with several interested Tribes to identify the potential effects of the proposed project on traditional cultural places, historic and sacred sites. EPA will continue to consult and coordinate with Tribes as necessary throughout the public comment period concerning these proposed permitting actions.

The public is encouraged to provide comment on these draft permits and the aquifer exemption by midnight mountain time, May 19, 2017. EPA's final permit decision will be based on an evaluation of comments received and a determination of whether underground sources of drinking water are protected. The draft permits can be found at the EPA Region 8 UIC Program website:

https://www.epa.gov/uic/uic-epa-region-8 (https://www.epa.gov/uic/uic-epa-region-8)

https://www.epa.gov/uic/administrative-record-dewey-burdock-class-iii-and-class-v-injection-well-draft-area-permits (https://www.epa.gov/sites/production/files/2017-03/documents/class_v_draft_area_permit_fact_sheet.pdf)

How to Comment:

Written comments must be received by email, fax or mailed to:

Valois Shea

shea.valois@epa.gov (shea.valois@epa.gov)

f ax: 303-312-6741

U.S. EPA Region 8 Mail Code: 8WP-SUI

1595 Wynkoop Street

Denver, CO 80202-1129

Public Information Sessions and Hearing Information (The public may also provide written and/or verbal comments during the following EPA public hearings):

Thursday, April 27, 2017 from 4:00 to 8:30 p.m. (with a break from 5:00 to 6:00 p.m.)

Niobrara Lodge, 803 US Highway 20, Valentine, Nebraska 69201
Monday-Tuesday, May 8-9, 2017, 1:00 to 8:00 p.m. (with a break from 5:00 to 6:00 p.m.)

The Best Western Ramkota Hotel, 2111 N. LaCrosse Street, Rapid City, South Dakota 57701
Wednesday, May 10, 2017, from 1:00 to 8:00 pm (with a break from 5:00 to 6:00 p.m.)

The Mueller Center, 801 S 6th Street, Hot Springs, South Dakota 57747
Thursday, May 11, 2017, from 1:00 to 8:00 pm (with a break from 5:00 to 6:00 pm)
St. James Catholic Church, 310 3rd Avenue, Edgemont, South Dakota 57735from

From the Permit:

Powertech USA submitted an application for a UIC Program Class V Area Permit proposing to construct and operate up to eight (8) deep injection wells within the Dewey-Burdock Project Boundary to be used for the disposal of treated uranium ISR process wastewater into the Minnelusa and Deadwood Formations. At the time the Class V Area Permit Application was submitted, Powertech anticipated that the two (2) Minnelusa and the two (2) Deadwood injection wells proposed in the Class V Permit Application would provide adequate disposal capacity for the Permit SD52173-00000 6 Dewey-Burdock Class V Draft Area Permit Fact Sheet volume of uranium ISR process wastewater that is expected to be generated at the site. As further explained below in Section 2.3, Powertech did not intend to request additional injection wells to be added under the Class V Area Permit unless the first four (4) wells did not provide adequate disposal capacity. However, Powertech withdrew the permitting request for the two Deadwood injections wells in a letter dated December 9, 2016.

This Class V Area Permit authorizes up to four (4) wells for injection into the Minnelusa Formation only. Powertech originally proposed the construction of the two (2) Minnelusa Formation injection wells listed in Table 1, but may elect to construct up to two (2) additional injection wells allowed under this Class V Area Permit. If Powertech decides that more than four (4) injection wells are needed to provide enough capacity to disposed of the treated ISR waste fluids, a modification under this permit will be required per 40 CFR § 144.39 and 40 CFR § 124.5. This process will involve issuing a draft permit modification subject to public comment on the modifications only.

Table 1. Injection Wells Proposed under the Class V Area Permit

~ = approximately

1. The approximate depths shown in this table are extrapolated from the type logs described in the Class V Permit Application. Actual injection zone depths will be determined from drill hole logs during well construction.
The Class V Permit Application, including the required information and data necessary to issue a UIC permit in accordance with 40 CFR parts 124, 144, 146 and 147, was reviewed by the EPA and determined to be complete.

This Class V Area Permit is issued for a time period of ten (10) years after the Permit Effective Date and will expire after that time. The Class V Area Permit also may be terminated upon delegation of primary enforcement responsibility for the Class V UIC Program to the State of South Dakota unless the State agency chooses to adopt and enforce this Permit. If Powertech wishes to continue any activity regulated by this Permit after the expiration date of this Class V Area Permit, Powertech must submit a complete application for a new Permit at least 180 days before the Class V Area Permit expires.

2.1 Injection Well Classification

The injection wells authorized under this permit are classified as Class V industrial wastewater injection wells. The proposed injection zone for injection wells DW No. 1 and DW No. 3 is the Minnelusa Formation, which overlies the Madison Formation, a USDW. Typically, Class I radioactive waste injection wells are used for process wastewater disposal at uranium ISR sites because process wastewater at these types of facilities usually meets the definition of "radioactive waste" under 40 CFR § 144.3. Class I radioactive waste disposal wells are required to inject fluids below the lowermost formation containing an underground source of drinking water within one quarter mile of the well bore per 40 CFR § 144.6(a)(3). Radioactive waste disposal above USDWs are classified as Class IV wells and are banned per 40 CFR § 144.13. Because the proposed Minnelusa injection zone for DW No. 1 and DW No. 3 is located above a USDW, these wells do not fit the regulatory definition of a Class I injection well. Therefore, in order to be able to inject in the Minnelusa, above USDWs, the permit requires Powertech to treat the injectate so that it does not fall under the definition of "radioactive waste." According to 40 CFR § 144.5(e)

Permit SD52173-00000 7 Dewey-Burdock Class V Draft Area Permit Fact Sheet:

Well Permit Number: SD52173-08764
Well Name: DW No. 1
Proposed Injection Zone: Minnelusa Formation
Anticipated Injection Zone Depth: ~1,615' - ~2,205'
Location within Project Area: Burdock

Well Permit Number: SD52173-08765
Well Name: DW No. 3
Proposed Injection Zone: Minnelusa Formation
Anticipated Injection Zone Depth: ~1,950' - ~2,540'
Location within Project Area: Dewey

Class V injection wells are those not included in Class I, II, III, IV or VI. Therefore, DW No. 1 and DW No. 3 must be classified as Class V injection wells.

Because these two wells will be used as deep disposal wells, the Class V Area Permit contains the protective construction and monitoring requirements designed for Class I injection wells. However, because these wells are Class V wells, the Class V Area Permit contains permit limits requiring injectate constituent concentrations to be at or below radioactive waste standards set in 10 CFR Part 20, Appendix B, Table II, Column 2 and hazardous waste standards set in 40 CFR § 261.24 Table 1.

The proposed injection zone for injection wells DW No. 2 and DW No. 4 is the Deadwood Formation, which is expected to lie beneath all USDWs in the area. These two wells fit the regulatory definition of Class I wells found at 40 CFR § 144.6(a). Even if Powertech treats the injectate for these two wells so that injectate constituent concentrations would be at or below radioactive waste standards set in 10 CFR Part 20, Appendix B, Table II, Column 2 and hazardous waste standards set in 40 CFR § 261.24 Table 1, these wells would still meet the definition of Class I other industrial well found at 40 CFR § 144.6(a)(2). South Dakota regulation 74:55:02:02 prohibits Class I injection wells in the State. When the EPA informed Powertech that the DW No. 2 and DW

No. 4 wells proposed for injection into Deadwood Formation are classified as Class I wells under UIC regulation 40 CFR § 144.6(a)(2), Powertech submitted a letter to the EPA withdrawing the request for authorization for construction and operation of wells injecting into the Deadwood Formation. Because there is no longer an active application for injection into the Deadwood Formation, there is no agency action related to injection into this formation.

https://www.epa.gov/sites/production/files/2017-03/documents/class_v_draft_area_permit_fact_sheet.pdf (https://www.epa.gov/sites/production/files/2017-03/documents/class_v_draft_area_permit_fact_sheet.pdf)

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